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ART UNIT	PAPER NUMBER
2153	

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Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)
Office Action Summary		09/909,739	MATE ET AL.
		Examiner	**Art Unit**	
		LaShanya R Nash	2153	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2001*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-67* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,14-32,35-55 and 58-67* is/are rejected.

7)☒ Claim(s) *8,9,33,34,56 and 57* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *9/10/01*.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claims 1-67 are pending.

Claim Objections

Claim 39 is objected to under 37 CFR 1.75 as being a substantial duplicate of

claim 38. When two claims in an application are duplicates or else are so close in

content that they both cover the same thing, despite a slight difference in wording, it is

proper after allowing one claim to object to the other as being a substantial duplicate of

the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.

Claim 32 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention.

Claim 32 recites the limitation "the MPLS or IP-VPN flows" in line 1. There is

insufficient antecedent basis for this limitation in the claim. Examiner suggests

amending the claim to recite dependence to claim 27 as opposed to claim 26, for proper

antecedent basis.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1,6,17, 25, 26 and 50-51 are rejected under 35 U.S.C. 102(e) as being

anticipated by Ramankutty (US Patent 6,502,163), hereinafter referred to as

Ramankutty.

In reference to claims 1, Ramankutty discloses a method for ordering entries in a ternary content addressable memory, based on longest prefix matching, (column 3, line 52 to column 4, line 18). Ramankutty explicitly discloses:

- A method for classifying a plurality of data flows (i.e. packets) in a router comprising the steps of, (column 1, lines 12-26; column 1, lines 37-55; column 3, line 52 to column 4, line 18):

    o partitioning a ternary content addressable memory (TCAM) into at least a first partition and a second partition (i.e. group); said first partition includes indices having highest priority ranging from a lowest index to a partition index (i.e. base address) and said second partition includes indices having lowest priority ranging from a highest index to said partition index, (column 4, lines 36-53; column 6, lines 10-55; column 2, lines 43-58);

    o loading one or more first flow TCAM entries of a first of said plurality of data flows into said first partition in a predetermined

order; loading one or more second TCAM entries of a second of

said plurality of data flows into said second partition in a

predetermined order (i.e. prefix length) , (column 4, lines 36-53;

column 6, lines 10-30; column 2, lines 43-58);

o   setting bit values of a corresponding mask for each of said first

TCAM entries and said second TCAM entries such that bits of said

respective first TCAM entries and said second TCAM entries are

individually masked by said masks, (column 5, lines 23-39 and

column 2, lines 22-34);

o   and comparing a prefix comprising predetermined packet header

information of an incoming packet to said loaded one or more first

TCAM entries and one or more second TCAM entries such that a

matching said one or more first TCAM entries subsumes any

matching said one or more second TCAM entries, (column 2, lines

13-61; column 1, lines 11-35; column 3, line 62 to column 4, line 5;

column 6, lines 10-30).

In reference to claim 25, Ramankutty discloses a method for ordering entries in a

ternary content addressable memory based on longest prefix matching, (column 3, line

52 to column 4, line18). Ramankutty further discloses the method employs an

associated CAM index space (column 4, lines 11-22). Ramankutty explicitly discloses:

- A method for classifying a plurality of data flows (i.e. packets) in a router comprising the steps of, (column 1, lines 12-26; column 1, lines 37-55; column 3, line 52 to column 4, line 18):

    o partitioning a ternary content addressable memory (TCAM) into at least a first partition and a second partition (i.e. group); said first partition includes indices having highest priority ranging from a lowest index to a partition index (i.e. base address) and said second partition includes indices having lowest priority ranging from a highest index to said partition index, (column 4, lines 36-53; column 6, lines 10-55; column 2, lines 43-58);

    o loading one or more first flow TCAM entries of a first of said plurality of data flows into said first partition in a predetermined order; loading one or more second TCAM entries of a second of said plurality of data flows into said second partition in a predetermined order (i.e. prefix length) , (column 4, lines 36-53; column 6, lines 10-30; column 2, lines 43-58);

    o setting bit values of a corresponding mask for each of said first TCAM entries and said second TCAM entries such that bits of said respective first TCAM entries and said second TCAM entries are individually masked by said masks, (column 5, lines 23-39 and column 2, lines 22-34; column 7, lines 58-67); and

o   comparing a prefix comprising predetermined packet header

information of an incoming packet to said loaded one or more first

TCAM entries and one or more second TCAM entries such that a

matching said one or more first TCAM entries subsumes any

matching said one or more second TCAM entries, (column 2, lines

13-61; column 1, lines 11-35; column 3, line 62 to column 4, line 5;

column 6, lines 10-30);

o   maintaining a flow index space having entries corresponding to said

TCAM; and determining said predetermined order of said first

TCAM entries and said predetermined order of said second TCAM

entries in said flow index space before said steps of loading said

one or more first TCAM entries, (column 4, lines 19-22; column 5,

lines 40-59; column 5, lines 10-19; column 40-59; column 6, line 56

to column 7, line 18; and column 2, lines 50-58).

In reference to claim 26, Ramankutty discloses a routing system (i.e. Figure 1)

comprising a ternary content addressable memory, that orders entries based on longest

prefix matching, (column 3, line 52 to column 4, line 18 and column 1, lines 36-55).

Ramankutty explicitly discloses:

•   A system for classifying a plurality of data flows (i.e. packets) in a router

comprising, (column 1, lines 12-26; column 1, lines 37-55; column 3, line

52 to column 4, line 18)

o   means for (i.e. Figure 1-item 104) partitioning a ternary content

addressable memory (TCAM) into at least a first partition and a

second partition, said first partition (i.e. base address) includes

indices having highest priority ranging from a lowest index to a

partition index and said second partition includes indices having

lowest priority ranging from a highest index to said partition index,

(column 5, lines 39-59; column 4, lines 36-53; column 6, lines 10-

55; column 2, lines 43-58);

o   means for (Figure 1-item 104) loading one or more first flow TCAM

entries of a first of said plurality of data flows into said first partition

in a predetermined order; means for (Figure 1-item 104) loading

one or more second TCAM entries of a second of said plurality of

data flows into said second partition in a predetermined order,

(column 5, lines 39-59;column 4, lines 36-53; column 6, lines 10-30;

column 2, lines 43-58);

o   means for (Figure 1-item 100) setting bit values of a corresponding

mask for each of said first TCAM entries and said second TCAM

entries such that bits of said respective first TCAM entries and said

second TCAM entries are individually masked by said masks,

(column 5, lines 23-39 and column 2, lines 22-34; column 7, lines

58-67) ; and

o   means for (Figure 1-item 100) comparing a prefix comprising

packet header information of in incoming packet to predetermined

said loaded one or more first TCAM entries and one or more

second TCAM entries, wherein a matching said one or more first

TCAM entries subsumes an matching said one or more second

TCAM entries, (column 2, lines 13-61; column 1, lines 11-35;

column 3, line 62 to column 4, line 5; and column 6, lines 10-30).

In reference to claim 50, Ramankutty discloses a routing system (i.e. Figure 1)

comprising a ternary content addressable memory, that orders entries based on longest

prefix matching, (column 3, line 52 to column 4, line 18 and column 1, lines 36-55).

Ramankutty explicitly discloses:

- A system for classifying a plurality of data flows (i.e. packets) in a router

  comprising, (column 1, lines 12-26; column 1, lines 37-55; column 3, line

  52 to column 4, line 18):

  o   means for (i.e. Figure 1-item 104) partitioning a ternary content

  addressable memory (TCAM) into at least a first partition and a

  second partition, said first partition includes indices having highest

  priority ranging from a lowest index to a partition index (i.e. base

  address) and said second partition includes indices having lowest

  priority ranging from a highest index to said partition index, (column

5, lines 39-59; column 4, lines 36-53; column 6, lines 10-55; column

2, lines 43-58);

o means for (Figure 1-item 104) loading one or more first flow TCAM

entries of a first of said plurality of data flows into said first partition

in a predetermined order; means for (Figure 1-item 104) loading

one or more second TCAM entries of a second of said plurality of

data flows into said second partition in a predetermined order,

(column 5, lines 39-59;column 4, lines 36-53; column 6, lines 10-30;

column 2, lines 43-58);

o means for (Figure 1-item 100) setting bit values of a corresponding

mask for each of said first TCAM entries and said second TCAM

entries such that bits of said respective first TCAM entries and said

second TCAM entries are individually masked by said masks,

(column 5, lines 23-39 and column 2, lines 22-34; column 7, lines

58-67) ; and

o means for (Figure 1-item 100) comparing a prefix comprising

packet header information of in incoming packet to predetermined

said loaded one or more first TCAM entries and one or more

second TCAM entries, wherein a matching said one or more first

TCAM entries subsumes an matching said one or more second

TCAM entries, (column 2, lines 13-61; column 1, lines 11-35;

column 3, line 62 to column 4, line 5; and column 6, lines 10-30);

and

o Means for (Figure 3) maintaining a flow index space having entries

corresponding to said TCAM; and determining said predetermined

order of said first TCAM entries and said predetermined order of

said second TCAM entries in said flow index space before said

steps of loading said one or more first TCAM entries, (column 4,

lines 19-22; column 5, lines 40-59; column 5, lines 10-19; column

40-59; column 6, line 56 to column 7, line 18; and column 2, lines

50-58).

All subsequent system claims are discussed with the associated method and apparatus

claims.

In reference to claim 51, Ramankutty discloses an apparatus (i.e. Figure 1)

comprising a ternary content addressable memory, that orders entries based on longest

prefix matching, (column 3, line 52 to column 4, line 18). Ramankutty explicitly

discloses:

o An apparatus for classifying a plurality of data flows in a routing system

comprising, (column 1, lines 12-26; column 1, lines 37-55; column 3, line 52

to column 4, line 18):

o a ternary content addressable memory (TCAM) (Figure 1-item 102),

(column 5, lines 11-30);

o a partitioning algorithm (i.e. logic) for partitioning said TCAM into at least a first partition and a second partition, said first partition includes indices having highest priority ranging from a lowest index to a partition index and said second partition includes indices having lowest priority ranging from a highest index to said partition index, (column 5, lines 39-59; column 4, lines 36-53; column 6, lines 10-55; column 2, lines 43-58);

o A loading algorithm (i.e. logic) for selecting a respective mask value to structure one or more first flow TCAM entries of a first of said data flows and one or more second flow TCAM entries and said respective mask values into said second partition, (column 5, lines 23-39 and column 2, lines 22-34; column 7, lines 58-67); and

o A search algorithm (i.e. logic) for performing an associative comparison of a prefix comprising predetermined packet header information of an incoming packet to said loaded one or more first flow TCAM entries and one or more second TCAM entries of a first of said plurality of data flows into said first partition in a predetermined order such that a matching said one or more first TCAM entries subsumes an matching said one or more second TCAM entries, (column 2, lines 13-61; column 1, lines 11-35; column 3, line 62 to column 4, line 5; and column 6, lines 10-30).

All subsequent apparatus claims are discussed with the associated method and system

claims.

In reference to claims 6,31, and 54 , Ramankutty explicitly discloses the

limitations, (column 4, lines 19-22; column 5, lines 40-59; column 5, lines 10-19; column

40-59; column 6, line 56 to column 7, line 18;column 2, lines 50-58; column 6, lines; and

Figure 3).

In reference to claims 17,42, and 61, Ramankutty explicitly discloses the

limitations, (column 6, lines 3-30 and column 2, lines 40-49).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 24 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Ramankutty (US Patent 6,502,163), in view of Pereira (US Patent 6,324,087)

and Hawkins (US Patent Application Publication 2002/0078040) hereinafter

referred to as Ramankutty, Pereira, and Hawkins.

In reference to claim 24, Ramankutty discloses a method for ordering entries in a

ternary content addressable memory, based on longest prefix matching, (column 3, line

52 to column 4, line 18). Ramankutty explicitly discloses:

- A method for classifying a plurality of data flows (i.e. packets) in a router

    comprising the steps of, (column 1, lines 12-26; column 1, lines 37-55;

    column 3, line 52 to column 4, line 18):

    o partitioning a ternary content addressable memory (TCAM) into at

        least a first partition and a second partition (i.e. group); said first

        partition includes indices having highest priority ranging from a

        lowest index to a partition index (i.e. base address) and said

        second partition includes indices having lowest priority ranging from

        a highest index to said partition index, (column 4, lines 36-53;

        column 6, lines 10-55; column 2, lines 43-58);

    o loading one or more first flow TCAM entries of a first of said

        plurality of data flows into said first partition in a predetermined

        order; loading one or more second TCAM entries of a second of

        said plurality of data flows into said second partition in a

        predetermined order (i.e. prefix length) , (column 4, lines 36-53;

        column 6, lines 10-30; column 2, lines 43-58);

    o setting bit values of a corresponding mask for each of said first

        TCAM entries and said second TCAM entries such that bits of said

respective first TCAM entries and said second TCAM entries are

individually masked by said masks, (column 5, lines 23-39 and

column 2, lines 22-34);

- o   and comparing a prefix comprising predetermined packet header

   information of an incoming packet to said loaded one or more first

   TCAM entries and one or more second TCAM entries such that a

   matching said one or more first TCAM entries subsumes any

   matching said one or more second TCAM entries, (column 2, lines

   13-61; column 1, lines 11-35; column 3, line 62 to column 4, line 5; -

   column 6, lines 10-30).

However, Ramankutty fails to explicitly show the aforementioned TCAM ordering

method wherein the first of the plurality of data flows are MPLS or IP-VPN flows.

Nonetheless, this would have been an obvious modification to the method as disclosed

by Ramankutty for one of ordinary skill in the art at the time of the invention, as further

evidenced by Pereira.

In an analogous art, Pereira discloses a method for partitioning TCAM based on

class or type of data stored in the partition for subsequent routing, (column 1, lines 54-

64 and column 4, lines 15-29). Pereira further discloses storing IP-VPN flows in TCAM

partitions, (column 4, line 58 to column 6, line 13). This modification would have been

obvious because one of ordinary skill in the art would have been so motivated to

implement this method in the aforementioned TCAM ordering method so as to employy

selective searching across partitions of CAM blocks according to flow class, and thereby

reducing the power consumption on selective compare operations, (Pereira column 2,

lines 13-17).

However, Ramankutty and Pereira fail to show the method wherein the second

plurality of data flows is policy based routing flows. Nonetheless, this would have been

an obvious modification to the method as disclosed by Ramankutty and Pereira for one

of ordinary skill in the art at the time of the invention, as further evidenced by

Hawkinson.

In another analogous art Hawkinson discloses a method for classifying policy

flows received by communication devices within a network, (column , lines 33-34;

column 6, line 57 to column 7, line 7; column 14, lines 50-63; Figure 4-item 334 and

Table 2). This modification would have been obvious because one of ordinary skill in the

art would have been so motivated to implement this method in the aforementioned

TCAM ordering method so as to employ selective searching across partitions of CAM

blocks according to flow class, and thereby reducing the power consumption on

selective compare operations, (Pereira column 2, lines 13-17).

In reference to claim 49, discloses a routing system employed for classifying

packets transmitted within a network according to prefix length, via partitioning

associated entries in a Ternary Content Addressable Memory (TCAM), (column 3, line

53 to column 4, line 4; column 1, lines 24-55; and Figure 1). Ramankutty explicitly

discloses:

- A method for classifying a plurality of data flows (i.e. packets) in a router comprising the steps of, (column 3, line 52 to column 4, line 18; column 1, lines 12-26; and column 1, lines 37-55):

  - Partitioning a ternary content addressable memory (TCAM) into at least a first partition and a second partition, (column 4, lines 36-53; column 6, lines 31-55 and column 2, lines 43-58);

  - The first partition includes indicies having highest priority ranging from lowest index to a partition index (i.e. base address) and the second partition includes indicies having lowest priority ranging from the highest index to the partition index, (column 4, lines 36-53; column 6, lines 31-55 and column 2, lines 43-58);

  - Loading one or more first flow TCAM entries of a first of the plurality of data flows into the first partition in a predetermined order (i.e. prefix length), (column 4, lines 36-53; column 6, lines 31-55 and column 2, lines 43-58);

  - Loading one or more second flow TCAM entries of a second of the plurality of data flows into the second partition in a predetermined order, (column 4, lines 36-53; column 6, lines 31-55 and column 2, lines 43-58);

  - Setting bit values of a corresponding mask for each of the first TCAM entries and the second TCAM entries such that bits of the respective first TCAM entries and the second TCAM entries are individually masked by the mask, (column 5, lines 23-39 and column 2, lines 18-34); and

- Comparing a prefix comprising predetermined packet header information
  of an incoming packet to the loaded one or more first TCAM entries and
  one or more second TCAM entries such that a matching the one or more
  first TCAM entries subsumes any matching the one or more second
  TCAM entries, (column 3, line 62 to column 4, line 5; column 6, lines 3-55;
  and column 2, lines 13-61; and column 1, lines 11-35).

However, Ramankutty fails to explicitly show the aforementioned TCAM ordering method wherein the first of the plurality of data flows are MPLS or IP-VPN flows. Nonetheless, this would have been an obvious modification to the method as disclosed by Ramankutty for one of ordinary skill in the art at the time of the invention, as further evidenced by Pereira.

In an analogous art, Pereira discloses a method for partitioning TCAM based on class or type of data stored in the partition for subsequent routing, (column 1, lines 54-64 and column 4, lines 15-29). Pereira further discloses storing IP-VPN flows in TCAM partitions, (column 4, line 58 to column 6, line 13). This modification would have been obvious because one of ordinary skill in the art would have been so motivated to implement this method in the aforementioned TCAM ordering method so as to employ selective searching across partitions of CAM blocks according to flow class, and thereby reducing the power consumption on selective compare operations, (Pereira column 2, lines 13-17).

However, Ramankutty and Pereira fail to show the method wherein the second pluralities of data flows are policy based routing flows. Nonetheless, this would have

been an obvious modification to the method as disclosed by Ramankutty and Pereira for

one of ordinary skill in the art at the time of the invention, as further evidenced by

Hawkinson.

In another analogous art Hawkinson discloses a method for classifying policy

flows received by communication devices within a network, (column , lines 33-34;

column 6, line 57 to column 7, line 7; column 14, lines 50-63; Figure 4-item 334 and

Table 2). This modification would have been obvious because one of ordinary skill in the

art would have been so motivated to implement this method in the aforementioned

TCAM ordering method so as to employ selective searching across partitions of CAM

blocks according to flow class, and thereby reducing the power consumption on

selective compare operations, (Pereira column 2, lines 13-17).

Claims 2, 27, and 52 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ramankutty as applied to claims above, in view of Pereira (US

Patent 6,324,087) hereinafter referred to as Pereira.

In reference to claims 2,27, and 52 although Ramankutty explicitly discloses

substantial features of the claimed invention the reference fails to disclose a method,

system, and apparatus wherein the first plurality of data flows are MPLS or IP-VPN

flows. Nonetheless, this would have been an obvious modification to the method,

system, and apparatus as disclosed by Ramankutty for one of ordinary skill in the art at

the time of the invention, as further evidenced by Pereira.

In an analogous art, Pereira discloses partitioning TCAM based on class or type
of data stored in the partition for subsequent routing, (column 1, lines 54-64 and column
4, lines 15-29). Pereira further discloses storing IP-VPN flows in TCAM partitions,
(column 4, line 58 to column 6, line 13). This modification would have been obvious
because one of ordinary skill in the art would have been so motivated to implement this
method in the aforementioned TCAM ordering method, system, and apparatus so as to
employ selective searching across partitions of CAM blocks according to flow class, and
thereby reducing the power consumption on selective compare operations, (Pereira
column 2, lines 13-17).

Claims 3-5,18,20, 28-30,43,45, 53, 62 and 64 are rejected under 35

U.S.C. 103(a) as being unpatentable over Ramankutty as applied to claims above,

and further in view of Hawkinson (US Patent 6,295,532), hereinafter referred to as

Hawkinson.

In reference to claims 3, 28, and 53 although Ramankutty explicitly discloses
substantial features of the claimed invention the reference fails to disclose a method,
system, and apparatus wherein the second plurality of data flows are policy based
routing flows. Nonetheless, this would have been an obvious modification to the method
as disclosed by Ramankutty for one of ordinary skill in the art at the time of the
invention, as further evidenced by Hawkinson.

In an analogous art, Hawkinson discloses a method for classifying policy flows received by communication devices within a network, (column , lines 33-34; column 6, line 57 to column 7, line 7; column 14, lines 50-63; Figure 4-item 334 and Table 2). This modification would have been obvious because one of ordinary skill in the art would have been so motivated to implement this modification in the aforementioned TCAM ordering method, system, and apparatus so as to employ selective searching across partitions of CAM blocks according to flow class, and thereby reducing the power consumption on selective compare operations, (Pereira column 2, lines 13-17).

In reference to claims 4-5, and 29-30 Ramankutty and Hawkinson show the claimed limitations, (Hawkinson column 4, line 66 to column 5, line 46).

In reference to claims 18, 43, and 62 Ramankutty and Hawkinson show the claimed limitations, (Ramankutty column 6, lines 3-30 and column 2, lines 40-49).

In reference to claims 20, 45, and 64 Ramankutty and Hawkinson show the claimed limitations, (Ramankutty column 2, lines 50-58, column 4, lines 19-22; column 5, lines 40-59;column 5, lines 10-19; column 6, line 56 to column 7, line 9).

Claims 7, 32, and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramankutty and Pereira as applied to claims above, an further

in view of Kaiserwerth et al. (US Patent 5,684,954), hereinafter referred to as Kaiserwerth.

In reference to claim 7, 32, and 55 although Ramankutty and Pereira show substantial features of the claimed invention, the references fail to show method, system, and apparatus wherein the MPLS or IP-VPN flows are classified by connection index (CIX) and destination address (DA), CIX only or DA only. Nonetheless, these aforementioned limitations were well known in the art at the time of the invention, as further evidenced by Kaiserwerth. Therefore, these would have been obvious modifications to the aforementioned method, system, and apparatus as disclosed by Ramankutty and Pereira.

In an analogous art, Kaiserwerth discloses processing various fields of a protocol header of data streams stored in CAM by a connection identifier and destination address, and connection address only for subsequent transmission in a network, (column 9, lines 39-60 and column 1, lines 8-11). This modification would have been obvious because one of ordinary skill in the art would have been so motivated to implement this modification in the aforementioned TCAM ordering method, system, and apparatus so as to provide a fast and reliable processing of addressing and connection information of data streams, and thereby increasing efficiency (Kaiserwerth column 2, lines 59-61).

Claims 14-15, 35, 40, and 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramankutty, Pereira and Kaiserwerth as applied to claims

above, an further in view of Brodnik et al. (US Patent 6,266,706), hereinafter referred to as Brodnik.

In reference to claims 14-15, 35, 40, and 58-59 Ramankutty, Pereira and Kaiserwerth show substantial features of the claimed invention, specifically maintaining a flow index space having entries corresponding to the TCAM, (Ramankutty column 2, lines 50-58, column 4, lines 19-22; column 5, lines 40-59), and assigning flow classified by CIX and DA or CIX only, (Kaiserwerth column 9, lines 39-60 and column 1, lines 8-11). However, the references fail to show assigning the flow-classified y CIX and DA and CIX only to a CIX prefix tree. Nonetheless, these aforementioned limitations were well known in the art at the time of the invention, as further evidenced by Brodnik. Therefore, these would have been obvious modifications to the aforementioned method, system, and apparatus as disclosed by Ramankutty Pereira and Kaiserwerth.

In an analogous art, Brodnik shows a prefix tree employed for determining where to route IP datagrams in a networking system, (column 5, line 35 to column 6, line 15; abstract; and Figures 3-4 item 7). One of ordinary skill in the art would have been motivated to implement the prefix tree into the aforementioned TCAM ordering method, system, and apparatus so as to increase routing lookup speeds and minimize routing lookup time, and thereby increasing efficiency, (Brodnik column 3, lines 30-33).

Claims 16, 41, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramankutty, Pereira and Kaiserwerth as applied to claims

above, an further in view of Patra et al. (US Patent 6,516,383), hereinafter referred to as Patra.

In reference to claims 16, 41, and 60 Ramankutty, Pereira and Kaiserwerth show substantial features of the claimed invention. However, the references fail to show removing a flow in the TCAM by freeing up a corresponding entry in the flow index space and invalidating a corresponding TCAM entry. Nonetheless, this would have been an obvious modification to the method, system, and apparatus as disclosed by Ramankutty, Pereira and Kaiserwerth, as further evidenced by Patra.

In an analogous art, Patra discloses a mechanism for efficient management of free space entries by deleting entries from an index space (i.e. TCAM table) and subsequently deleting the entry located at the associated address in TCAM, (column 3, line 65 to column 4, line 4; column 4, lines 20-33; and column 5, lines 58-65). One of ordinary skill in the art would have been motivated to implement the aforementioned limitations into the TCAM ordering method, system, and apparatus so as to employ an efficient mechanism that enables rapid location and utilization of free regions in TCAM, and thereby increasing efficiency, (Patra column 3, lines 60-63).

Claims 21, 46, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramankutty and Hawkinson as applied to claims above, and further in view of Patra et al. (US Patent 6,516,383) and Washburn (US Patent 6,081,440), hereinafter referred to as Patra and Washburn respectively.

In reference to claims 21,46, and 62 Ramankutty and Hawkinson show substantial features of the claimed invention. However, the references fail to show removing a flow in the TCAM by freeing up a corresponding entry in the flow index space and invalidating a corresponding TCAM entry. Nonetheless, this would have been an obvious modification to the method, system, and apparatus as disclosed by Ramankutty and Hawkinson, as further evidenced by Patra.

In an analogous art, Patra discloses a mechanism for efficient management of free space entries by deleting entries from an index space (i.e. TCAM table) and subsequently deleting the entry located at the associated address in TCAM, (column 3, line 65 to column 4, line 4; column 4, lines 20-33; and column 5, lines 58-65). One of ordinary skill in the art would have been motivated to implement the aforementioned limitations into the TCAM ordering method, system, and apparatus so as to employ an efficient mechanism that enables rapid location and utilization of free regions in TCAM, and thereby increasing efficiency, (Patra column 3, lines 60-63). However, Ramankutty, Hawkinson, and Patra do not disclose compacting the flows in the TCAM by moving each remaining TCAM entry up by one index. Nonetheless, this limitation would have been an obvious modification to the TCAM ordering method, system, and apparatus for one of ordinary skill in the art as further evidenced by Washburn.

In an analogous art, Washburn discloses an "order delete" function in order to delete a ternary CAM location is deleted, and the CAM data values below the deleted location are shifted upward in order, (column 5, lines 28-57 and column 6, lines 57-63). One of ordinary skill in the art would have been motivated to modify the TCAM ordering,

so as to reduce the time required to delete a data value stored in TCAM while

maintaining the predetermined order, thereby increasing efficiency (Washburn column

5, lines 22-25).

Claims 19, 22,44, 47, 63, and 66 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ramankutty and Hawkinson as applied to claims above, an

further in view of Kaiserwerth et al. (US Patent 5,684,954), hereinafter referred to

as Kaiserwerth.

In reference to claims 19, 22, and 63 although Ramankutty and Hawkinson

disclose substantial features of the claimed invention, the references fail to show

mapping the ACL flow to multiple flows in the TCAM wherein the mask for each of the

multiple flows covers a portion of the range of source or destination ports for optimally

determining a number of flows to cover the portion of the range. Nonetheless, his

modification would have been obvious to the method, system, and apparatus as

disclosed by Ramankutty and Hawkinson to one of ordinary skill in the art at the time of

the invention, as further evidenced by Kaiserwerth.

In an analogous art, Kaiserwerth discloses processing various fields of a protocol

header of data streams stored in CAM by mapping flows to multiple flows in the CAM

wherein the mask for each of the multiple flows covers a portion of the range of source

or destination ports for optimally determining a number of flows to cover the portion of

the range, (column 5, line 58 to column 6, line 20 and column 8, line 20-58). This

modification would have been obvious because one of ordinary skill in the art would

have been so motivated to implement this modification in the aforementioned TCAM

ordering method, system, and apparatus so as to provide a fast and reliable processing

of addressing and connection information of data streams, thereby increasing efficiency

(Kaiserwerth column 2, lines 59-61).

In reference to claim 22, 47, and 66 Ramankutty, Hawkinson, and Kaiserwerth

show the claimed limitations, (Ramankutty column 2, lines 50-58; column 4, lines 19-22;

and column 5, lines 40-59).

Claims 23, 48, and 67 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ramankutty, Hawkinson, and Kaiserwerth as applied to claims

above, and further in view of Patra et al. (US Patent 6,516,383) and Washburn (US

Patent 6,081,440), hereinafter referred to as Patra and Washburn respectively.

In reference to claims 23,48, and 67 Ramankutty, Hawkinson, and Kaiserwerth

show substantial features of the claimed invention. However, the references fail to show

removing a flow in the TCAM by freeing up a corresponding entry in the flow index

space and invalidating a corresponding TCAM entry. Nonetheless, this would have

been an obvious modification to the method, system, and apparatus as disclosed by

Ramankutty and Hawkinson, as further evidenced by Patra.

In an analogous art, Patra discloses a mechanism for efficient management of

free space entries by deleting entries from an index space (i.e. TCAM table) and

subsequently deleting the entry located at the associated address in TCAM, (column 3, line 65 to column 4, line 4; column 4, lines 20-33; and column 5, lines 58-65). One of ordinary skill in the art would have been motivated to implement the aforementioned limitations into the TCAM ordering method, system, and apparatus so as to employ an efficient mechanism that enables rapid location and utilization of free regions in TCAM, and thereby increasing efficiency, (Patra column 3, lines 60-63). However, Ramankutty, Hawkinson, and Patra do not disclose compacting the flows in the TCAM by moving each remaining TCAM entry up by one index. Nonetheless, this limitation would have been an obvious modification to the TCAM ordering method, system, and apparatus for one of ordinary skill in the art as further evidenced by Washburn.

In an analogous art, Washburn discloses an "order delete" function in order to delete a ternary CAM location is deleted, and the CAM data values below the deleted location are shifted upward in order, (column 5, lines 28-57 and column 6, lines 57-63). One of ordinary skill in the art would have been motivated to modify the TCAM ordering, so as to reduce the time required to delete a data value stored in TCAM while maintaining the predetermined order, thereby increasing efficiency (Washburn column 5, lines 22-25).

Allowable Subject Matter

Claims 8-13; 33-34, 36-41, and 56-57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The claims indicate a novel and specific method, system, and apparatus for further partitioning and ordering of TCAM entries based upon Connection Index (CIX), destination address (DA), CIX only, or DA only. These limitations are not disclosed or obvious over related prior art.
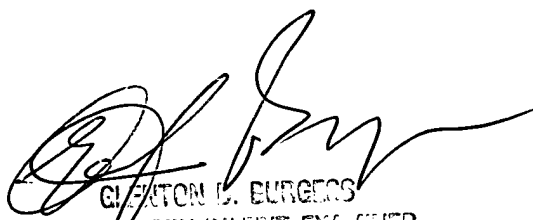
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LaShanya R Nash whose telephone number is (571) 272-3957. The examiner can normally be reached on 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess can be reached on (571) 272-3949. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

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December 13, 2004

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